California State University, Sacramento (CSUS)

University of California, Davis (UCD)

California Department of Transportation (Caltrans)

EVALUATION OF STORM WATER TREATMENT BY VEGETATED AREAS ADJACENT TO HIGHWAYS

Presented at:

International Erosion Control Association (IECA), 34th Annual Conference and Expo., Las Vegas, Nevada, February 24-28, 2003

Authors:

Misty Scharff, A.P.S.S.c., Caltrans/CSUS Storm Water Program
Anna Lantin, P.E., RBF Consulting, Irvine, CA
David Alderete, Caltrans/CSUS Storm Water Program

Disclaimer:

This work reflects the author's opinions and does not represent official policy or endorsement by the California Department of Transportation, the California State University, or the University of California.

Caltrans Storm Water Program
Office of Water Programs, CSU, Sacramento
7801 Folsom Boulevard, Suite 102, Sacramento, CA 95826

PP043

EVALUATION OF STORM WATER TREATMENT BY VEGETATED AREAS ADJACENT TO HIGHWAYS

Misty Scharff and David Alderete
Office of Water Programs
California State University, Sacramento

Anna Lantin
RBF Consulting

Abstract
The California Department of Transportation has approved vegetative filter strips as a Best Management Practice to improve water quality in storm water runoff. Design parameters important for a vegetated filter strip's effective performance include: flow velocity, residence time as a function of length and slope, infiltration, and vegetation density. The state agency establishes vegetation adjacent to highways to accommodate a range of functions including: erosion control, aesthetic, safety, environmental mitigation, and storm water pollution prevention. Furthermore, the state agency maximizes the use of vegetated areas for highway improvement projects. Due to the range of functions that vegetated areas adjacent to highways do serve, the design of a vegetated system may not necessarily conform to standard design guidelines for vegetative filter strips.

The state agency initiated a two-year study to assess the treatment effectiveness of existing vegetated areas adjacent to its highways. Eight vegetated areas were equipped with two to five 30-m collection channels to capture highway runoff as it passes through various lengths of the vegetated area and at the edge of pavement. The flow paths between the edge of pavement and the various collection channels ranged from 1.1 m to 13.0 m. The slopes ranged from 5 percent to 52 percent. In the 2001-2002 rainy season, between 14 to 18 storms were monitored at each of the four Northern California test sites. Because of dry weather, only 2 to 8 storms were monitored at each of the four Southern California test sites. As a result of the dry weather, almost all the highway runoff at the four Southern California test sites infiltrated into the vegetated slopes.

Average total suspended solids (TSS) for the eight test sites in the highway runoff measured at the edge of pavement ranged from 30 to 170 mg/L. Preliminary TSS data from the northern sites showed removal rates of 44 to 88 percent, depending on slope and length. As expected, flatter slopes and longer flow paths improved TSS removal. Notable TSS removal was observed even on steep slopes (greater than 30 percent) and short slopes (between 1 to 3 m). Preliminary trends for total metals behave similarly to the preliminary TSS trends. Monitoring is scheduled to continue for another year.

Key Words: storm water treatment; Best Management Practices; highway runoff; biofiltration strips.